

REMARKS

Claims 18, 19 and 22-24 have been amended. New dependent claims 25-27 have been added. Reexamination and reconsideration are respectfully requested.

Initially, the drawings were objected to in the Office Action for not showing the electromotive vehicle's "drive device". As this term has been deleted from claims 22-25, the drawings should now be acceptable.

Regarding numbered paragraph 2 of the Office Action, Applicants submit their cover sheet accompanying this continuation application directed the U.S. Patent and Trademark Office to amend the specification to insert the appropriate reference to the parent application. Applicants have now amended same to recite the U.S. Patent number as well.

In the Office Action, claims 22-24 were rejected under 35 U.S.C. §112, first paragraph. Applicants respectfully traverse this rejection to the extent it is understood. As noted in Applicants' background of the invention section (page 1), electromotive vehicles using a permanent magnet electric rotating machine are known. Accordingly, claims 22-24 are sufficiently enabled by the specification which discloses the particular permanent magnet electric rotating machine according to the present invention that can form a part of an electromotive vehicle. Withdrawal of this rejection is respectfully requested. Applicants do not understand the recitation on page 3, lines 5-6 of the Office Action concerning the "instant invention's spacer posts disposed in contact with facing surfaces of adjacent magnetic laminations". Applicants cannot find such a recitation in their specification and, therefore, assume this is a clerical error.

Regarding the 35 U.S.C. §112, second paragraph rejection of claims 18-19, Applicants have amended these claims as suggested by the Examiner.

In the Office Action, claims 18-24 were rejected under the judicially created doctrine of obviousness-type double patenting over U.S. Patent 6,208,054 in view of U.S. Patent 5,475,277. Accordingly, Applicants submit herewith a terminal disclaimer to obviate this rejection.

Lastly, claims 18-19 were rejected as being anticipated by BRANDES et al. (US 5,672,926). Applicants respectfully traverse this rejection in view of the following remarks.

Applicants' invention recites a permanent magnet electric rotating machine comprising a stator and a rotor. The rotor has plural permanent magnet insertion holes arranged circumferentially in a ring-shaped arrangement (see Fig. 1 for example). Permanent magnets 9 are embedded in the insertion holes. Auxiliary magnetic pole portions 16 are provided between two adjacent plural permanent magnets. Claim 19 also recites the magnetic pole piece portions 15 arranged between the plural permanent magnets and the stator.

As a result of this novel construction in conjunction with the magnetic air gaps, the magnetic flux density between the plural permanent magnets and the auxiliary magnetic pole portions is formed smoothly and a cogging torque is restrained.

By contrast to Applicants' claimed invention, BRANDES et al. provides no disclosure, teaching or suggestion for utilizing its iron core portion of the rotor between the permanent magnets as an "auxiliary magnetic pole portion" in the manner defined by the present invention. As Applicants note in the

specification, page 14, lines 4-7, the auxiliary magnetic poles 16 are defined such that:

“Accordingly, a magnetic flux generated from the stator winding 4 passes through the permanent magnet 9 and the auxiliary magnetic pole 16. A reluctant torque is then generated.”

With the provision of the magnetic gap provided in both sides of the peripheral direction of the plural permanent magnets (claim 18) or between the auxiliary magnetic pole portions and the magnetic pole piece portions (claim 19), the change in magnetic flux density of the permanent magnet and the auxiliary magnetic pole portion is formed smoothly and the cogging torque is restrained.

In BRANDES, a hybrid-energized electric machine is provided. This hybrid-energized electric machine includes permanent magnets having the same polarity arranged adjacently, there being no provision to have oppositely polarized permanent magnets. Because of this, the magnetic flux distribution changes continuously and therefore a reluctance torque is not generated. It should therefore be clearly understood that portions 13 in BRANDES' hybrid-energized electric machine are only non-energized pole parts (col. 3, lines 14-16). These non-energized pole parts 13 produce a continuously changing magnetic flux distribution and do not produce a discontinuous portion as occurs in Applicants' invention.

In view of the above, Applicants submit claims 18 and 19 are patentable over BRANDES et al.

Finally, Applicants have added claims 26 and 27 which depend from claims 18 and 19, respectively. These claims recite that each of the plural

permanent magnets extend substantially the entire axial length of the rotor. As suggested by the Examiner in the parent application serial number 08/946,581, now U.S. Patent 6,208,054, this feature clearly overcomes the BRANDES reference which is divided into rotor halves, each half having permanent magnets of only a single plurality. Accordingly, Applicants submit newly added dependent claims 26 and 27 are also patentable over BRANDES.

For the foregoing reasons, Applicants submit claims 18-27 are in condition for allowance. An early notice to that effect is solicited.

Summarizing, Applicants have made an important contribution to the art to which the present subject matter pertains, for which no counterpart is shown in any of the art or combination of same. The invention is fully set forth and carefully delimited in all claims in this case. Under the patent statute, Applicants should not be deprived of the protection to which they are entitled for this contribution. Accordingly, it is respectfully requested that favorable reconsideration and an early notice of allowance be provided for all remaining claims.

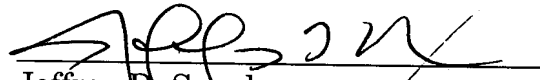
If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

please charge any deficiency in fees or credit any overpayments to Deposit
Account No. 05-1323 (Docket #381NP/43816CO).

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend the first line of the specification as follows:

This application is a continuation of application Serial No. 08/946,581, filed October 7, 1997, which is now U.S. Patent No. 6,208,054, issued March 27, 2001.

Please amend claims 18, 19 and 22-24 as follows:

18. (Amended) A permanent magnet electric rotating machine comprising:

a stator; and

a rotor arranged at a side of an inner periphery of said stator with a rotation air gap;

said rotor having plural permanent magnet insertion holes arranged [with a ring form] circumferentially in a ring-shaped arrangement, permanent magnets embedded in said plural permanent magnet insertion holes, and auxiliary magnetic pole portions provided between two adjacent plural permanent magnets, wherein

a magnetic air gap is provided in both sides of a peripheral direction of said plural permanent magnets,

thereby a change in a magnetic flux density between said plural permanent magnets and said auxiliary magnetic pole portions is formed smoothly and a cogging torque is restrained.

19. (Amended) A permanent magnet electric rotating machine comprising:

a stator; and

a rotor arranged at a side of an inner periphery of said stator with a rotation air gap;

said rotor having plural permanent magnet insertion holes arranged [with a ring form] circumferentially in a ring-shaped arrangement, permanent magnets embedded in said plural permanent magnet insertion holes, auxiliary magnetic pole portions provided between two adjacent plural permanent magnets, and magnetic pole piece portions arranged between said plural permanent magnets and said stator, wherein

a magnetic air gap is provided between said auxiliary magnetic pole portions and said magnetic pole piece portions,

thereby a change in a magnetic flux density between said plural permanent magnets and said auxiliary magnetic pole portion is formed smoothly and a cogging torque is restrained.

22. (Amended) An electromotive vehicle comprising a [drive device, wherein said drive device includes the] permanent magnet electric rotating machine according to claim 18.

23. (Amended) An electromotive vehicle comprising a [drive device, wherein said drive device includes the] permanent magnet electric rotating machine according to claim 19.

24. (Amended) An electromotive vehicle comprising a [drive device, wherein said drive device includes the] permanent magnet electric rotating machine according to claim 20.